

Advanced Structural Health Monitoring, Phase I

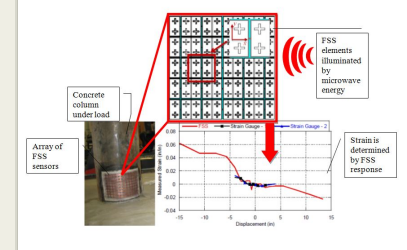
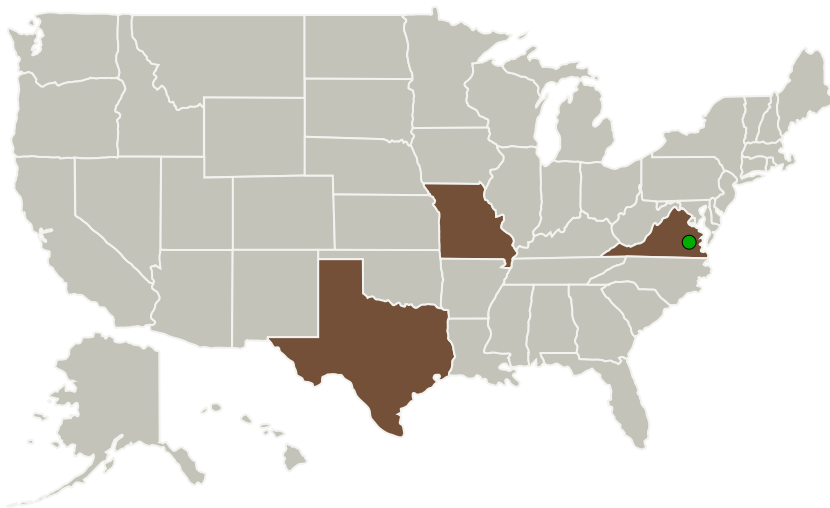
Completed Technology Project (2017 - 2018)



Project Introduction

Frequency selective surfaces (FSSs) are periodic arrays of conductive elements or patches that cause a particular reflection or transmission response when illuminated with high frequency electromagnetic energy. These arrays have been used as high frequency filters and in radar, stealth and advanced antenna applications, and more recently, as sensors. In particular, FSS-based sensing has found a home as a next-generation structural health monitoring (SHM) approach. FSS sensors are inherently wireless and passive, and are interrogated remotely via microwave energy. These sensors can be embedded in layered dielectric (non-conducting) structures during manufacture or installed during the service lifetime on the surface (conductive or dielectric). Microwaves penetrate through dielectrics, so in the case of layered structures, FSS sensors can be placed on materials/layers of interest that may be covered by additional dielectrics (such as reentry heat tiles covered with insulation). Multiple sensing parameters can be concurrently sensed through proper sensor design and interrogation, as is illustrated below through a strain and temperature sensor. This Phase I effort will focus on creating a design for a field deployable prototype that can be ruggedized for use in space environments.

Primary U.S. Work Locations and Key Partners



Advanced Structural Health Monitoring Lead Center: LaRC,
Phase I Briefing Chart Image

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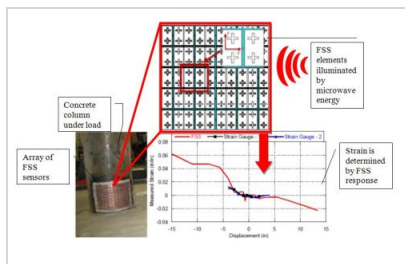


Organizations Performing Work	Role	Type	Location
Texas Research Institute Austin, Inc.	Lead Organization	Industry	Austin, Texas
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Missouri University of Science and Technology	Supporting Organization	Academia	Rolla, Missouri

Primary U.S. Work Locations

Missouri	Texas
Virginia	

Images



Briefing Chart Image

Advanced Structural Health Monitoring Lead Center: LaRC,
Phase I Briefing Chart Image
(<https://techport.nasa.gov/image/135024>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Texas Research Institute Austin, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

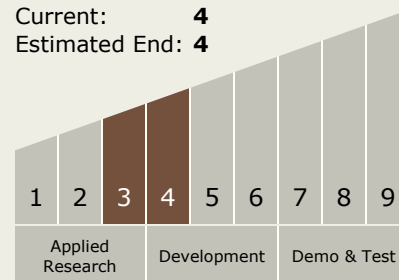
Russell K Austin

Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.3 Reliability and Sustainment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System